treated contains more than the normal amount (at that age) of solid constituents and phosphorus.

The very opposite effects are produced by daily doses of alcohol or the frequent production of cerebral anæmia.

As incidental results, the author mentions further that there is a difference between the two hemispheres in new-born animals. The centres for movements of the limbs are more excitable in the *left* hemisphere, while mastication can be provoked more easily from the right hemisphere. This observation, if applicable to man, would explain right-handedness.

There is a certain correlation between the activity of different cortical centres. The natural act of mastication will, for instance, reduce the excitability of the centres governing the limbs. The cortical excitability is also much reduced by sleep and by derivation of attention, for instance by the sight of meat (young puppies). The same influences diminish also the reflex excitability of the animal. H. G.

Secretory and Trophic Gland Nerves. — R. Heidenhain, *Pflüger's Archiv*, XVIII., p. 1. From his researches on the submaxillary gland of the dog, H. formulates the law, that the *percentage* of salts in the saliva increases with the total amount of saliva, when the secretory nerve (chorda) is irritated up to a certain limit. This increase of salts occurs independent of the physiological condition of the gland. The amount of *organic* solids, however, depends not only on the degree of irritation of the nerve, but also on the state of rest or fatigue of the gland. With the same degree of excitation of the secretory nerve, the percentage of organic solids diminishes the longer the gland has been in action. By increasing the excitation of the nerve, the proportion of organic residue augments likewise. But if the secretory nerve of a fresh (not fatigued) gland be stimulated, the percentage of organic matter will remain high after cessation of the stimulus, and diminish subsequently less rapidly than the inorganic salts. Hence, H. concludes that the secretion of water and salts on the one hand, and of the organic substance on the other hand, occurs under different conditions.

As regards the parotid gland of the dog, H. confirmed the statement of Loeb, that the secretory nerve is a branch of the glosso-pharyngeal nerve, entering the tympanic cavity with the tympanic branch, and passing thence into the cranial cavity to join the superficial pretrosal nerve. It finally reaches the gland with the auriculo-temporal branch of the trigeminus. The other gland-nerve is the sympathetic. The latter contracts the blood-vessels of the gland; the former dilates them. The pressure under which the parotid secretion can still occur, may amount to a column of mercury of 106 to 118 mm. in height, a tension greater than the blood pressure in the smaller vessels.

After prolonged action of the gland, the parotid saliva becomes impoverished in organic constituents; less so in the amount of salts. By increasing the electric stimulus, both organic and inorganic constituents increase in percentage; but if the gland is exhausted, only the *salts* augment in proportion.

Heidenhain could not find any influence of the sympathetic on the amount

of parotid saliva. But if the two secretory nerves (cerebral and sympathetic) are simultaneously excited, the percentage of organic matter increases considerably, both in the dog and rabbit. This could not have been the result of the anæmia due to sympathetic excitation, since no such effect was observed by interrupting the blood supply of the gland.

As H. had previously shown, the microscopic appearance of gland cells is altered by a long-continued nerve excitation. This change is slight after excitation of the cerebral nerve, but more considerable and somewhat different after stimulation of the sympathetic, although the latter nerve, when stimulated alone, does not produce any parotid secretion whatever.

In conclusion, H. maintains the theory that there exist secretory nerves influencing the secretion of water and salts, and trophic fibres governing the secretion of organic matter. The former fibres predominate in the cerebral gland nerves; the latter are mostly contained in the sympathetic salivary nerves.

Some entirely new facts as regards the innervation of the submaxillary gland, have been found by J. N. Langley (*Journal of Phys.*, Vol. I., No. 1, p. 96), in the cat, an animal not yet examined in this respect. In the dog, as is well known, the saliva normally obtained by stimulation of the sympathetic nerve, is extremely viscid, containing much mucin; whilst that obtained by stimulation of the chorda tympani is more or less watery, containing a much less quantity of mucin. In the cat, however, the sympathetic saliva is less viscid than the chorda saliva. In dogs the chorda is paralyzed by a small quantity of atropia, but the sympathetic not at all (or only by excessive doses.—Langley). In the cat, on the other hand, the two nerves are almost alike in their susceptibility to the paralytic effects of atropia. In the dog, simultaneous stimulation of both nerves checks the secretion, the two nerves being apparently antagonistic to each other; but in the cat, minimal effective stimuli, when applied simultaneously to the chorda and sympathetic nerves, are not antagonistic, as regards secretion; on the contrary, the amount of secretion from the simultaneous stimulation is at least equal to the sum of the amounts from separate stimulation. The effect of stimulation of either nerve is even increased by faradizing the other nerve with a current by itself insufficient to provoke secretion. Only when both nerves are simultaneously exposed to *very strong* currents, the amount of secretion which the chorda alone can produce is somewhat lessened by the action of the sympathetic, probably from its influence on the vessels of the gland.

These researches were continued by Langley in a subsequent number (Vol. I., Nos. 4 and 5, p. 332) of the *Journal of Physiology* and extended to the antagonism of atropin and pilocarpin on the submaxillary gland of the cat. We can mention his principal results partly in his own words.

An exceedingly small quantity of pilocarpin, 0.001 gram., will call forth a lively secretion of saliva. A few minutes after the beginning of the secretion so produced, stimulation of the chorda causes an increase in the flow, which is much less than the flow caused by equal chorda stimulation previous to the pilocarpin injection. The effect of stimulating the sympathetic is in like manner diminished, but proportionately less.